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Indian Standard

**SPECIFICATION FOR
SHIPS' INTERMEDIATE SHAFTS
(INTEGRAL FLANGE)**

PART II FOR SEA-GOING VESSELS

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(*Continued on page 2*)

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(Continued on page 8)

Indian Standard
**SPECIFICATION FOR
SHIPS' INTERMEDIATE SHAFTS
(INTEGRAL FLANGE)
PART II FOR SEA-GOING VESSELS**

0. FOREWORD

0.1 This Indian Standard (Part II) was adopted by the Indian Standards Institution on 30 August 1974, after the draft finalized by the Marine Engineering Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 Only the dimensions important for the interchangeability and the limitation of the required tools such as drilling jigs, reamers and centring plates have been given in this standard.

0.3 The principle that the flange under the bolt head and under the nut is not to be machined or milled for torque transmitting shaft has been considered while selecting the maximum shaft diameter D and the minimum possible flange diameter D_1 .

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part II) deals with the materials, dimensions and tolerances for ships' intermediate shafts for sea-going vessels from 181 to 1 100 mm shaft diameter.

2. TERMINOLOGY

2.1 For the purpose of this standard, the terms and definitions given in 'Indian Standards Glossary of terms for ships' propellers' (under preparation) shall apply.

*Rules for rounding off numerical values (revised).

3. MATERIALS

3.1 The material used for various parts shall be as shown below:

<i>Part</i>	<i>Material conforming to</i>
Shaft	IS : 3261-1966*
Coupling bolt (cylindrical head)	IS : 1364-1967† (up to M39)
Nuts (hexagonal head)	IS : 3138-1966‡ (M42 to M150)

4. DIMENSIONS

4.1 The various dimensions for intermediate shafts shall be as given in Table 1.

4.2 The nominal diameter of coupling bolts shall be equal to bolt hole diameter and they shall be precision-turned to a surface finish $\nabla \nabla \nabla$ in accordance with IS : 3073-1967§.

4.3 The threaded portion of the bolts shall be turned so as to suit the standard nut sizes given in Table 1.

4.4 The coupling bolt shall have a minimum of two threads on the portion of the shank inside the coupling bolt hole to facilitate proper tightening.

4.5 For proper mating of the bolt head with the flange face, the shank shall be undercut near the bolt head, as shown in Fig. 1. The diameter of the shank at the undercut shall not be less than the root diameter of the threaded portion of the bolt.

4.6 A reasonable length of the bolt left unthreaded at the end for withdrawal of coupling bolts by hammering.

4.7 The inside face of the nut coming in contact with flange shall be machined to have a uniform metallic contact.

5. TOLERANCES

5.1 The tolerance on the bolt hole diameters shall be of H13 series in accordance with IS : 919-1963||.

5.2 The tolerance on bolt diameters shall be of m7 series in accordance with IS : 919-1963||.

*Specification for carbon steel forgings for shipbuilding industry.

†Specification for precision and semi-precision hexagon bolts, screws, nuts and lock nuts (dia range 6 to 39 mm) (*first revision*).

‡Specification for hexagonal bolts and nuts (M42 to M150).

§Assessment of surface roughness.

||Recommendations for limits and fits for engineering (*revised*).

5.3 The tolerance on shaft diameter and flange diameter shall be in accordance with IS : 2102-1969*.

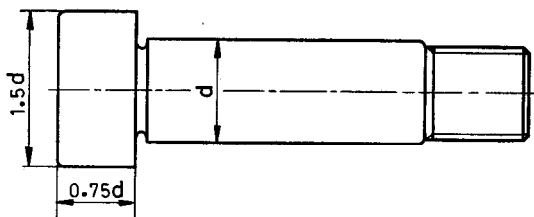


FIG. 1 COUPLING BOLT

6. WORKMANSHIP AND FINISH

6.1 All coupling flanges shall be machine finished. Coupling bolt holes shall be reamed perfectly together with adjacent shafts and spot faced. These holes shall be suitable for fitted bolts. After reaming the holes at the manufacturer's works the coupling flanges shall be marked for correct mating at site in the shipbuilding yard. The bolts and the corresponding bolt holes on the shaft flanges shall also be marked for identification.

6.2 For the first intermediate shaft (the shaft connecting the propulsion engine or gear box output shaft to the remaining line shafting) the aft flange shall be reamed perfectly together with the adjacent shaft flange and spot faced and shall be suitable for fitted bolts. The forward coupling flange (the flange mating with the propulsion engine or gear box output shaft flange) shall be provided with bolt holes to suit the main engine or gear box flange. The bolt holes on this forward flange shall be smaller than the final diameter (diameter of bolt hole on the propulsion engine or gear box flange) in order to ream those holes together with those on the engine or gear box flange at site in the shipbuilding yard. However, the flange shall be fully machined.

6.2.1 The thickness of this coupling is governed by that of the engine or gear box flange. Also in practice the ship builders specify certain amount of allowance on both sides of the thickness of this flange to cope up with the variation in the length of the ships' structure at site from that of the design. The flange shall be machine finished keeping this allowance.

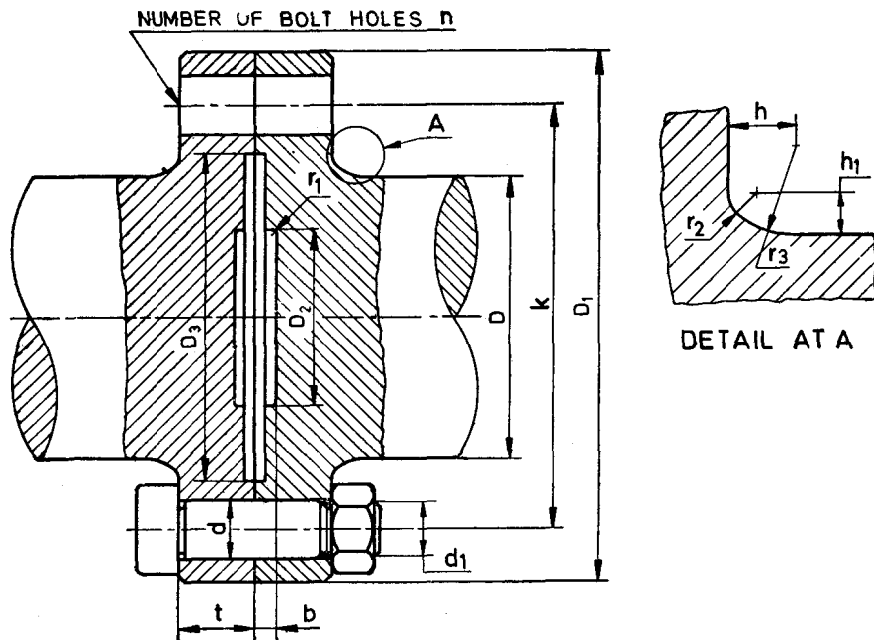
6.3 The finished shaft shall be tested for static balancing before fitment.

*Allowable deviations for dimensions without specified tolerances (*first revision*).

TABLE 1 DIMENSIONS OF INTERMEDIATE SHAFTS

(Clauses 4.1 and 4.3)

All dimensions in millimetres.



SHAFT DIA- METER D Max	FLANGE DIA- METER D_1 Min	FLANGE THICK- NESS t Min	PITCH CIRCLE DIA- METER k	NUM- BER OF BOLT HOLES n	BOLT HOLE DIA- METER d	NUT SIZE TO SUIT THE BOLT d_1	CENTRING CHAMBER				ROUNDING OFF FROM SHAFT TO FLANGE			
							D_2	D_3	b	r_1	r_2	r_3	h	h_1
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
181	325	48	265	8	33	M30 × 2	100	205	12	1	8	28	23	14
200	355	54	290	8	36	M33 × 2	100	225	12	1	10	32	24	15
216	385	58	315	8	42	M39 × 3	150	245	12	1	12	36	25	16
227	420	61	340	8	45	M42 × 4.5	150	260	12	1	14	40	27	18
257	450	70	370	10	45	M42 × 4.5	150	290	12	1	14	40	27	18
283	480	76	400	10	52	M48 × 5	200	315	14	1	14	45	33	20
304	535	82	440	10	56	M52 × 5	200	345	14	1	16	50	36	23
335	580	90	480	10	62	M56 × 5.5	200	375	14	1	18	60	42	25
374	620	101	520	10	66	M60 × 5.5	250	415	16	2	18	60	42	25
416	670	112	570	10	66	M60 × 5.5	250	460	16	2	20	65	47	29
445	740	122	620	12	70	M64 × 6	250	500	16	2	22	70	50	31
477	800	129	670	12	82	M76 × 6	300	530	16	2	25	80	55	34
537	860	145	730	12	82	M76 × 6	300	590	16	2	25	80	55	34
580	935	156	790	12	91	M85 × 6	300	640	16	2	25	90	62	36
627	1 000	170	850	12	101	M95 × 6	300	690	16	2	28	95	66	40
687	1 070	186	920	14	101	M95 × 6	300	750	16	2	28	100	73	45
739	1 165	200	1 000	14	112	M105 × 6	300	820	16	2	32	110	82	50
829	1 265	224	1 100	16	112	M105 × 6	300	900	16	2	32	117	90	55
900	1 390	243	1 200	16	127	M120 × 6	300	980	16	2	36	125	97	60
1 010	1 510	272	1 320	18	127	M120 × 6	300	1 100	16	2	36	135	106	65
1 100	1 670	297	1 450	18	137	M130 × 6	300	1 200	16	2	40	150	115	70

7. DESIGNATION

7.1 The intermediate shafts shall be designated by shaft diameter and number of this standard.

Example:

An intermediate shaft of diameter 283 mm shall be designated as:

Intermediate shaft 283 IS : 7411 (Part II)

8. MARKING

8.1 Each intermediate shaft shall be permanently marked with the following information:

- a) Diameter of the shaft given in Table 1, and
 - b) Manufacturer's trade-mark.
-

(Continued from page 2)

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